BSC 307 Science Literacy Lesson Plan Form

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| Title: Hold Back your Tears! Onion Root Tip Cell Lab | Grade Level:  11-12 |
| Objectives:  TSWBAT recognize the stages of mitosis in onion root tip cells.  TSWBAT produce a graph of information gathered from the lab.  TSWBAT interprets the data by creating a graph. | |
| Illinois State Learning Standards: Stage H: 12 A: 2 | |
| Science Literacy Skills:  Ask, find, or determine answers to questions derived from curiosity about everyday experiences. | |
| Activity Description: Students will complete a lab with onion cells. A pre-lab with questions and vocabulary will be given at the start of the lab which the students must complete before beginning the lab. Next, students will work in groups of three and have one microscope. I will have pre-made slides of stained onion root tip cells for the students to look at under the microscope and see the stages of mitosis. Although these are plant cells, not animal cells, students will still be able to see the stages of mitosis. Students will record how many cells they see under the microscope and record in on their lab sheet (only the section of cells they can see under the lens at one time). Next, students will count the number of times they see each stage of mitosis in the cells and record it on their lab sheet. Students will also, make drawings of the cells at each mitotic stage. At the end of the lab, students will be required to make a graph of the data through Microsoft Word or Excel and answer the series of questions on the post lab sheet. | |
| Assessment Strategies: Students will create a graph of the data collected which will be turned in the next day along with the lab sheets and all will be graded. | |
| Rationale: Cell division is the foundation for understanding and learning other science topics which is why it is important for students to become comfortable with the concept. This lab activity will allow the students to get practice using microscopes while also letting them see visually the stages of mitosis in onion cells. I will use onion root tip cells, because when stained, show the mitotic cycle. Students will get practice creating and interpreting a graph of their data which will build science literacy skills and help with future classes that will use graphs and charts. | |
| Resources: Lab found at:  <http://www.cabrillo.edu/~ytan/Bio11AF04/Cell%20Division.pdf>  I made several changes to the lab, because I wanted to make the lab shorter and not just focus on the mitosis concepts.  Illinois State Board of Education. (1997). Illinois State Learning Standards. [On- line]. Retrieved on March 23, 2011. Available: <http://www.isbe.net/ils/Default.htm>. | |

\* Please attach any and all handouts/worksheets to this lesson plan

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Hold Back your Tears! Cell Division Lab**

**Pre-Lab Exercise:**

1. Using your own words, define the following terms:

a. Mitosis:

b. Chromosome:

c. Chromatid:

d. Centromere:

e. mitotic spindle:

2. What is the purpose of mitosis?

**Mitosis in Plant Cells: Onion Root Tip**

The tip of a plant root is the growing portion of the root and contains many cells undergoing mitosis. Following the procedure below, make a squash of an onion root tip to stain and visualize these cells.

**\*Steps a-f will be completed by the instructor:**

a. Root tips have already been treated with hydrochloric acid (HCl) to loosen the cell walls and make the cells easier to separate.

b. Remove a root tip and carefully place it on a clean microscope slide.

c. With a razor blade, cut off and discard all but 3-4 millimeters of the whitish tip. Using two probes tease apart the tissue so that it is reduced to very small pieces.

d. Add some acetocarmine stain so that the tissue is completely covered.

e. Heat for 5 to 10 seconds by constantly moving the glass slide 1/2 to 1 inch above the flame. Do not let the slide dry out and do not let the stain boil off. Add more stain while you are heating if necessary. It takes some practice to know how much heat is necessary, so don't be discouraged if your root tip gets fried the first time.

f. Add a coverslip and then gently squash the tissue flat with the wooden end of a probe or with your finger. Hold the preparation up to the light and look for a light reddish color in the bits of tissue.

**Begin the lab:**

Step 1: Find a cell in each stage of mitosis using the 40X lens. Make sure you can see different mitotic phases. If you are having trouble, let me know and I will help adjust your microscope.

Step 2: Count the number of cells you see under the microscope and record in your table. (ONLY the cells in your view, DO NOT count all of the cells on the entire slide)

Step 3: Count the number of cells that are in each stage of mitosis and record in your table.

Step 4: Make a drawing of a cell in each stage of mitosis. Make sure that each of your drawings is large (~ 1/4 page) and clear! Label each drawing with a description of

what is happening in the cell during that stage of mitosis.

Step 5: Create a graph on Excel or Microsoft Word showing the number of cells at each stage vs. the stages.

Total # of cells you see looking through the microscope:\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| Cell Division Stages: | # of Cells at Each Stage |
| Interphase |  |
| Prophase |  |
| Metaphase |  |
| Anaphase |  |
| Telophase |  |

**Complete the Post Lab Questions:**

Q1. The life cycle of a cell consists of interphase and four phases of mitosis. In which part of the life cycle does a cell spend most time? What observation did you make during the lab to support your answer?

Q2. Why can you not see chromosomes in interphase cells?

Q3 Why can you not see a nucleus in mitotic cells?

Q4. How would you explain to someone what they should look for to decide whether a cell is in anaphase or telophase?